FINAL DRAFT

WASTE ROCK AREAS WORK PLAN

FEBRUARY 14, 2003

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February 14, 2003

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Subject: Response to Comments on the Draft Waste Rock Areas dated August 20, 2002 and submittal of the Draft Final Waste Rock Areas Work Plan for the Yerington Mine

Atlantic Richfield Company appreciates this opportunity to respond to the comments provided by the regulatory agencies on October 28, 2002 for the subject document. This response to comments letter is attached to the Draft Final Waste Rock Areas Work Plan.

NDEP Comments

General Comment

The proposed sample quantities and locations are inadequate to defensibly characterize the various tailings areas. Sampling should not only characterize these materials for all potential constituents of concern and establish background concentrations of naturally occurring metals in soils, but also vertically delineate the characterized material. The limited sampling proposed will not provide adequate information to allow future decisions regarding vertical migration of fluids. It is inadequate to evaluate potential hazards to human health and the environment, does not establish background concentrations of metals for comparison of analytical results, will not provide adequate information to avoid conflict and thus is not in the best interest of all parties concerned. Please propose a statistically defensible sampling plan of all tailings areas and background soil locations that will satisfy the requirements listed above.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment, and includes additional sampling locations for the three waste rock areas (WRAs). Atlantic Richfield proposes to excavate, as deemed safe and if necessary, waste rock pile side slopes to collect a fully representative series of samples *for geochemical and geotechnical analyses. In addition to the collection of surface and near-surface samples, and as described in the Draft Groundwater Conditions Work Plan with modifications per discussions with NDEP, two boreholes will be drilled to support the installation of soil moisture probes in the W-3 and S-32 WRAs. Samples from these boreholes will also be used to characterize lithologically diverse materials at depth.*

NDEP Specific Comments

Page 1, Location
There is no mention that Anaconda Leached the W-3 WRA. There is historic documentation that shows the dump was leached in 1965-1968,1972,1974,1975. From the records it appears that it may have been leached continuously for at least 10 years. Parts of the transite pipe return and feed lines are still in place along with some of the leach lines.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

Page 3, WRA Geochemistry
In addition to the copper high the mercury content also appears to be on the high side in the three samples noted. Are the mercury levels high enough to warrant mentioning here?

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

Page 6, 2.1 South Waste Rock Area Construction & Operation
Misquoted (Joe Sawyer); South WRA was used to store waste rock and alluvium from the Yerington pit only, not various sources.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

Various operators in the past have excavated sand and gravel from the South WRA for construction use off site.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

Page 8, 2.2 W-3 WRA Construction and Operation
See page 1 comments above, on Anaconda leaching of W3 WRA left out completely.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

Page 9, 2.3 S-32 (Sulfide Ore) Waste Rock Area Construction and Operation
Add this was a low-grade sulfide ore stockpile constructed by Anaconda.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

Physical Description
2nd paragraph first sentence typo.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

Page 12, Solids Sampling
One-foot sample depth is inadequate. Some of this material could have been in place for 40 years or more. Near surface material may be oxidized/altered.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment. Please see response to NDEP's General Comment.

Appendix A
Poor copies can't read assay sheets

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

Appendix B
Need Photos of S-32 Dump also more complete photos of W3 and South Dump.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

EPA Comments

1) Several critical questions remain unanswered by this workplan. They include:

a) Presence of perched liquids on the old Anaconda liner.
b) Do materials vary with depth?
c) What are the leaching properties of the waste rock materials?
d) Will precipitation that falls onto the waste rock piles leach through the piles into the groundwater?

Response to Comment:

a) Atlantic Richfield assumes that this comment refers to the liner under the W-3 WRA. Although perched fluids may exist, it appears unlikely given that no seeps or drainage have been observed along its side slopes. Based on this empirical observation, Atlantic Richfield concludes that gravity drainage off the liner does not occur.

b) As described in response to NDEP's General Comment, Atlantic Richfield proposes to drill one borehole each in the W-3 and S-32 WRAs to support moisture monitoring in these units. Samples collected from these boreholes will be used to characterize lithologically diverse waste rock materials at depth. The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

c) The leaching characteristics of waste rock materials were presented in the Draft Waste Rock Areas Work Plan (Appendix A). In addition, Atlantic Richfield proposes to install subsurface moisture monitoring probes in the W-3 and S-32 WRAs to evaluate the percolation of meteoric water through the mine units and their potential to generate leachate.

d) See (c) above.

2) Page 3, 1st paragraph; The background values cited in this report may represent background soil levels, however, it is premature to cite them definitively as background at this time. EPA has also collected a possible background sample, BK-1, with the results included in EPA's "Anaconda, Yerington Mine Site Emergency Response, Assessment Final Report," dated June 30, 2001. EPA can provide this report if needed. Appropriate background levels should be discussed in our Technical Workgroup meetings.

Response to Comment: The information presented in the Draft Work Plan represented the best information on background soil values available to Atlantic Richfield at the time. Atlantic Richfield appreciates EPA's pointing out the data from BK-1 as a possible background sample, and the analytical results from BK-1 are included in the attached Draft Final Waste Rock Areas Work Plan. Additional background soil samples will be *collected and analyzed as described in the Draft Final Cover Materials Work Plan. Atlantic Richfield anticipates that appropriate background levels will be discussed in our Technical Workgroup meetings.*

3) Radionuclide screening and/or analyses should be proposed. At a minimum, all samples should be screened for radionuclides and a percentage of samples should be analyzed in the laboratory.

Response to Comment: Atlantic Richfield is currently evaluating radionuclide data for the site. Pending the results of this evaluation, the final version of the Waste Rock Areas Work Plan may include radionuclides in the list of analytical parameters.

4) Page 3; It is premature to draw conclusions regarding the homogeneity of materials in all areas and limiting the amount of sampling proposed based on this hypothesis. Sufficient sampling should be proposed to confirm this hypothesis.

Response to Comment: Please see responses to above NDEP and EPA comments. The attached Draft Final Waste Rock Areas Work Plan has been modified to include additional samples, including borehole samples from the W-3 and S-32 WRAs. Atlantic Richfield proposes to conduct sampling at safely accessible locations along each WRA, including possible excavations, to collect representative samples.

5) Page 3, Section 1.3; The previous test results for the waste rock material indicate that leachates will likely contain some copper along with sulfate, and a trace of alkalinity. However, sampling and testing has been very limited and objectives of the proposed sampling should determine whether the past results are representative.

Response to Comment: Given that laboratory leachate testing may not be representative of in-situ field conditions, and may exaggerate potential leachate chemistry, Atlantic Richfield does not propose to conduct additional leaching tests. Instead, as described in the attached Draft Final Waste Rock Areas Work Plan, Atlantic Richfield proposes to collect empirical hydraulic data within representative WRAs. These data will be used to determine the potential for meteoric water to percolate through the waste rock, which could result in the seepage of leachate from the base of the waste rock piles. Closure of similar waste rock piles and heap leach pads from an inactive copper mine in a similar climatic setting (Equatorial Tonopah, Inc.) has been approved by the NDEP – Bureau of Mining Regulation and Reclamation on the basis of empirical data, including leachate chemistry and flow rates, and a nominal two-foot closure cap.

6) Page 4; The discussion regarding exposure scenarios is incomplete. In order to provide a conservative estimate of risk for comparison, the residential exposure pathway is required to be assessed for each area. This also would give an evaluation of the risk any trespassers would encounter although every effort is underway to ensure that the Site is inaccessible. After the data is collected, it should be compared to screening values, such as EPA Region IX Preliminary Remediation Goals. At this time, the determination can be made as to the necessity of a risk assessment for a given area. There is also no discussion of possible exposure pathways for ecological receptors. Regulatory agency staff have observed wildlife in these areas and potential pathways should be considered in planning the investigation.

Response to Comment: The Draft Waste Rock Areas Work Plan referred to the conceptual site model (CSM) and provided the CSM flow diagram (Figure 3), which describes exposure pathways from surface mine units such as a WRA. Atlantic Richfield agrees that the collected data should be compared to the appropriate screening values, which will be presented in the Data Summary Report for the Waste Rock Areas. Such comparisons may serve as a tool for decision making for post-closure conditions at the site, which will be evaluated in the development of the Final Permanent Closure Plan.

7) As mentioned in prior meetings, Atlantic Richfield must make an effort to research the known history of the waste rock areas. At a minimum, Atlantic Richfield should review Anaconda and NDEP records, and attempt to interview past employees to determine their potential knowledge of historical usage.

Response to Comment: Atlantic Richfield has attempted to eliminate undocumented anecdotal information from providing the basis for field investigations proposed under the Scope of Work. If EPA possesses written information that documents observations or other historical information, Atlantic Richfield will review such information and incorporate as appropriate into the Final Waste Rock Areas Work Plan. The attached Draft Final Waste Rock Areas Work Plan has been modified to incorporate comments from NDEP's on-site contractor, Mr. Joe Sawyer of SRK Consulting, because Atlantic Richfield has been able to substantiate his personal site knowledge with field checks, maps and file reviews.

8) Page 8, Section 2.2,W-3 waste rock area; What is known about the previous leach pad and leaching operations of Anaconda in this area? What chemicals were used for leaching? Any analysis of the leachate? Could any of this leachate still be pooled on the old liner? Are there any analyses of the runoff from this area?

Response to Comment: Please see response to similar NDEP comment. The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

9) Page 9, Section 2.3, S-32 Sulfide Ore; The statements that these are "Sulfide Ore" with "minimal surface oxide staining" and "appear to have been thoroughly oxidized", seem to be contradictory. Are there any analyses of the runoff or surface ponding water?

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

10) Page 12, Section 3.2, Solids sampling; It appears that only surface samples will be collected (up to one foot depth). This assumes that deeper materials are the same. This should be verified by sampling at depth in at lease one location in each waste rock area. Materials at depth may differ as they were mined at different times, from perhaps different areas of the mine pit, and surface samples may be made oxidized and leached due to exposure over many years.

Response to Comment: Please see responses to previous NDEP and EPA general and specific comments.

11) Section 3.2; Waste Rock samples should also be analyzed for leaching properties as leachates and runoff may impact groundwater. The leaching method used should simulate natural leaching conditions.

Response to Comment: Please see responses to previous EPA comment 1(b).

12) Table 3; Please check your table for proposed metals and methods of analyses. At a minimum, antimony, silver and thallium should also be included.

Response to Comment: The attached Draft Final Waste Rock Areas Work Plan has been revised to address this comment.

USDI/FWS Comments

This Plan is deficient in the following areas. Information is needed on the potential uptake of metals and trace elements by vegetation at these sites. Some vegetation may be deeply rooted and may eventually penetrate any cover caps that may be provided on these sites. Vegetation may be consumed by wildlife or cattle, exposing them to the metals and trace elements that are taken up by the plants. Burrowing mammals may experience dermal exposure to the materials (i.e., waste rock, leach heap, or evaporation pond) if the mammals penetrate any caps on these sites. The risks from these types of exposure should be analyzed.

Response to Comment: As described above, the Draft Waste Rock Areas Work Plan referred to the conceptual site model (CSM) and provided the CSM flow diagram (Figure 3), which describes exposure pathways from surface mine units such as a WRA. Atlantic Richfield agrees that the collected data should be compared to the appropriate screening values, which will be presented in the Data Summary Report for the Waste Rock Areas. Such comparisons may serve as a tool for decision making for post-closure conditions at the site, which will be evaluated in the development of the Final Permanent Closure Plan.

Information is needed on the standards and toxicity benchmarks that will be used to evaluate any data that will be collected in relation to these three work plans.

Response to Comment: Please see response to the above comment.

The document states that "Stormwater may either pond on the surface of the WRA, or run off to an adjacent slope" for both the W-3 waste rock area (section 2.2) and the S-32 waste rock area (section 2.3). Water that ponds on the surface of the waste rock areas should be collected and analyzed for an array of metals and trace elements to determine if the concentrations of various constituents that are present pose a risk to wildlife, including migratory birds, that could drink these solutions. Information should also be collected on flow paths of water from waste rock areas, to determine if it may impact surface waters such at the Walker River.

Response to Comment: Historical records do not indicate that standing water on the surface of waste rock areas, or run-off from these areas, has occurred. Therefore, the reference to possible ponding water and runoff has been deleted from the attached Draft Final Waste Rock Areas Work Plan.

If you have any questions regarding the revised document or the responses to comments, please contact me at 1-406-563-5211 ext. 430.

Sincerely,

Dave McCarthy
Project Manager

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SECTION 1.0
INTRODUCTION

Atlantic Richfield Company has prepared this Draft Final Waste Rock Areas Work Plan (Work Plan) to conduct field investigations that will support an evaluation of human health and ecological risk associated with, and to support planning for the permanent closure of, three Waste Rock Areas (WRAs) at the Yerington Mine Site. This Work Plan is being conducted pursuant to the *Closure Scope of Work for the Yerington Mine Site* (SOW; Brown and Caldwell, 2002a). As stated in the SOW, the Work Plan will include "materials inventory and static testing". Results of the proposed site investigation activities presented in this Work Plan will be compiled and presented in a Waste Rock Areas Data Summary Report.

The remainder of Section 1.0 of this Work Plan describes the location and hydrologic setting of the Waste Rock Areas, previous sampling and analytical results, and describes the data quality objectives (DQOs) for this Work Plan in more detail. Section 2.0 presents information about the construction and operational history of the WRAs, and a description of their current status. Section 3.0 presents the details of the site investigation activities including proposed sampling locations, sampling protocols, and quality assurance and quality control (QA/QC) objectives in the context of the *Draft Quality Assurance Project Plan* (QAPP; Brown and Caldwell, 2002b) for the Yerington Mine Site. Section 3.0 of this Work Plan also presents a task-specific Job Safety Analysis in the context of the *Site Health and Safety Plan* (SHSP; Brown and Caldwell, 2002c) for the Yerington Mine Site. Section 4.0 lists references cited in this Work Plan.

1.1 Location

The Yerington Mine Site is located west and northwest of the town of Yerington in Lyon County, Nevada (Figure 1). The WRAs are located north and south of the Yerington Pit, as shown in Figure 2, and consist of three geographically distinct topographic features described below:

South WRA — The South WRA is the largest of the three WRAs, occupies the majority of disturbed land south of the Yerington open pit.

W-3 WRA — The W-3 WRA is located north of the open pit and the Phase IV-Slot Heap Leach Pad, and was partially mined by Arimetco for leaching on the Phase I, II, III, and IV-Slot Heap Leach Pads (*Draft Arimetco Heap Leach and Process Components Work Plan*; Brown and Caldwell, 2002d).

S-32 WRA — The S-32 WRA generally consists of low-grade material stockpiled west of the Phase I/II Heap, and south of the Arimetco Plant Site.

1.2 Hydrogeologic Setting

The principal source of water in the Yerington area of Mason Valley is the Walker River (Huxel, 1969). The East and West Walker Rivers originate in the Sierra Nevada mountain range and merge south of the mine site, from where the Walker River flows northward through the valley to Walker Gap. From Walker Gap, it turns eastward and then southeastward to Weber Reservoir and ultimately to its terminus, Walker Lake. The Walker River is the primary source of natural recharge to the alluvial groundwater flow system that underlies the mine site, given that recharge from precipitation is very low (the annual average precipitation rate in the area is 5.46 inches per year; Huxel, 1969).

The native ground beneath the WRAs consists of unconsolidated alluvial fan deposits derived by erosion of the uplifted mountain block of the Singatse Range and fluvial (flood-plain) sediments deposited by the Walker River. A detailed assessment of groundwater conditions at the Yerington Mine Site is the subject of the *Draft Groundwater Conditions Work Plan* (Brown and Caldwell, 2002e), a companion document to this Work Plan. The assessment of groundwater flow and quality beneath and down-gradient of the mine site, including the WRAs, is discussed in the *Draft Groundwater Conditions Work Plan* and the *Draft Yerington Pit Lake Work Plan* (Brown and Caldwell, 2002f), which describes bedrock groundwater flow in the area adjacent to the open pit.

1.3 Previous Monitoring and Data Acquisition

Existing information for the WRAs consists of limited references in design or evaluation records from other mine units. Based on limited materials testing results and field observations, waste rock materials at the site appear to be similar in lithology and mineralogy. A portion of the W-3 WRA was subjected to leaching operations (Anaconda, 1968) followed by removal of a good portion of the material by Arimetco as ore material. The Arimetco excavation allows good observation of the W3-WRA lithology. The WRAs include two principal material types:

- Alluvial overburden removed to allow open-pit mining of waste and ore; and
- Bedrock consisting of variably altered and mineralized quartz monzonite (generally classified as either oxide or sulfide).

WRA Material Geochemistry

The U.S. Environmental Protection Agency (EPA, 2000) collected waste rock samples from the S-32 and W-3 WRAs as part of an initial CERCLA evaluation of the mine site. Sample T-11 was submitted as a duplicate of sample T-2 from the S-32 WRA, and sample T-4 was collected from the W-3 WRA. Whole-rock analytical results are provided in Appendix A, and are summarized in Table 1. General background soil values are also presented in Table 1 for comparison, including sample BK-1 (EPA, 2000) and representative soils metals concentrations reported by Shacklette and Boerngen (1984). The abundance of copper in the samples is expected, given that the mineralized bedrock in the WRAs was enriched in copper.

During engineering design of Arimetco's Phase IV-Slot Heap, a sample of proposed leach material from the W-3 WRA was subjected to the Meteoric Water Mobility Procedure (MWMP), and static testing (i.e., acid/base accounting or ABA). The results of these tests are also included in Appendix A. The ABA results indicate that this material is slightly acid consuming (i.e., buffering), with a net neutralization potential (NNP) between 0 and 10.

Physical Stability

Engineering documents prepared for Arimetco's Phase IV-Slot Heap Leach Pad included an evaluation of bulk slope stability, recommended constructed slope angles and benches, and soil strength properties. Because waste rock materials are identical in geologic character and grain size distribution to the heap materials, these results may be generalized for all WRAs for an evaluation of physical stability. Data such as in-place angle of repose may also be used in evaluating slope stability for the WRAs.

1.4 Data Quality Objectives

The Data Quality Objectives (DQOs) for field sampling and analytical activities described in this Work Plan include the collection of appropriate data to support the:

- Assessment of ecological and human health risk from exposed WRA materials to possible down-wind and down-gradient receptors.
- Development and evaluation of closure alternatives for the WRAs.

A four-step DQO process was utilized to develop the activities described in this Work Plan. The DQOs will ensure that data of sufficient quality and quantity are collected to meet the project objectives. The four steps include:

- Step 1. State the Problem;
- Step 2. Identify the Decision;
- Step 3. Identify the Inputs to the Decision; and
- Step 4. Define the Boundaries of the Study.

The problem statement (Step 1) is as follows: "It is unknown whether WRA materials may have the potential to create a risk to human health and the environment.

Step 2 of the DQO process (Identify the Decision) asks the key question that this Work Plan is attempting to address: "What monitoring, sampling and analytical activities for the WRAs will serve to evaluate the potential for ecological and human health risk, and support closure of the Yerington Mine site?" The activities proposed in this Work Plan will be integrated with existing data, and results from other Work Plan activities, to answer this question. The criteria necessary to determine if the proposed Work Plan activities will answer this question include:

- Will the collected data adequately document the potential source characteristics and potential migration pathways of potential constituents of concern (COCs) associated with the WRAs;

- Will the collected data support an evaluation of environmental pathway processes that could affect the fate and transport of these materials; and
- Will the collected data provide an appropriate baseline to evaluate closure alternatives for the WRAs (e.g. chemical and physical stability of solid materials).

Step 3 of the DQO process (Identify the Inputs to the Decision) identifies the kind of information that is needed to address the question posed under Step 2. Relevant historical information, previous analytical results, data collected as part of this Work Plan, potential migration pathways and potential down-gradient receptors will be evaluated to answer the question posed in Step 1 of the DQO process. This information will be integrated in the context of the Conceptual Site Model for the Yerington Mine Site (CSM; Brown and Caldwell, 2002g). The flow diagram from the CSM is reproduced as Figure 3 of this Work Plan.

Analytical results from the activities proposed in this Work Plan will be compared to appropriate screening levels or guidelines to address the potential for human health or ecological risk associated with the WRAs. This comparison will be presented in the Data Summary Report for the Waste Rock Areas. As provided for in the Yerington Mine Site Scope of Work, an evaluation of the potential for ecological or human health risk associated with the WRAs will be addressed in the Final Permanent Closure Plan (FPCP) for the Yerington Mine Site. The information obtained from the proposed site investigation activities will also provide the basis to support the evaluation of closure alternatives for the site.

Step 4 of the DQO process (Define the Boundaries of the Study) defines the spatial and temporal aspects of the field monitoring, sampling and analytical activities proposed in this Work Plan. The field and analytical activities described in this Work Plan are anticipated to be conducted for the three identified WRAs shown on Figure 2 during 2003.

SECTION 2.0

BACKGROUND INFORMATION

The WRAs shown in Figure 2 appear to have been constructed in two major stages. As described above, waste rock materials consist of alluvium and weakly mineralized or non-mineralized quartz monzonite bedrock. The bedrock materials consist of several lithologic variations of quartz monzonite (Proffett and Dilles, 1984). The remainder of Section 2.0 includes a discussion of each WRA organized under the following headings:

- Construction and Operation
- Land Status
- Physical Description

2.1 South Waste Rock Area

Construction and Operation

The South WRA is the oldest of the three areas, and may include minor amounts of alluvium removed during exploration or limited lode mining as early as the 19th century. Based on field observations, the South WRA appears to have received the majority of its material from stripping of alluvial overburden and from the mining and placement of relatively low-grade bedrock materials adjacent to the open pit. The South WRA has also been excavated for construction materials for on-site and off-site use.

Land Status

The South WRA is located almost entirely on land controlled by the BLM. Portions near the Yerington Pit are located on private land.

Physical Description

The South WRA covers a ground area of approximately 388 acres. Its elevation ranges from approximately 4,600 feet above mean sea level (amsl) along its west side to approximately 4,750 feet amsl near its east side. The side slopes are generally at the angle-of-repose (about 1.4H:1V), and have a maximum height of 160 feet in the southeast corner of the WRA. Portions of the top of the area are generally flat, with a surface area of approximately 294 acres (see Appendix B, Photos 1 and 2). The top surfaces are sloped at 2 to 5 percent to the north.

The South WRA appears to have been constructed in two phases. The first phase includes the lower flat area at its south end, where vegetation is well established (roughly estimated at 50 percent cover consisting of rabbit brush up to 6 feet in diameter, and several species of bunch grasses and other shrubs). The second phase of the South WRA is characterized by similar but sparser vegetation, covering approximately 5 to 20 percent of the surface area. Particle size ranges from approximately 8-inch plus to silt-sized. A brief inspection of field conditions, and a review of the topographic map of the South WRA, indicates relatively stable slopes.

2.2 W-3 Waste Rock Area

<u>Construction and Operation</u>

Historic records indicate that dump leaching of the W-3 Waste Rock dump began in 1965 (Anaconda, 1965 and 1968). Dilute sulfuric acid, produced at the Acid Plant, was applied to the W-3 Waste Rock dump to leach copper from the waste rock materials (Anaconda, 1965).

Following acquisition of the property in 1989, Arimetco (1993) produced an engineering design report for the Phase IV-Slot Heap Leach Pad, which described the W-3 WRA as “low-grade oxide copper ore that is most often described on maps as tailings”. According to Arimetco’s 1993 design report, this WRA was expanded and heightened over a period of nearly twenty years. Arimetco excavated an area termed the “Slot”, and hauled the excavated materials to heap leach pads. The “Slot” was mined to a depth close to original surface topography (Figure 5).

<u>Land Status</u>

The W-3 WRA is located almost entirely on land controlled by the BLM. A portion of the southwest corner, near the Arimetco Plant Site is located on private land.

Physical Description

The remaining portion of the W-3 WRA, after it was excavated to supply leach materials for the Phase IV-Slot Heap, covers an area of approximately 84 acres. Its elevation ranges from approximately 4,404 feet amsl at the southeast corner of the entrance to the Slot, to approximately 4,646 feet amsl in the center of the WRA. The side slopes are slightly benched, occur generally at the angle-of-repose (i.e., about 1.4H:1V), and have a maximum height of 210 feet on the northwest face (see Appendix B, Photo 3). The top of the W-3 WRA is generally flat, with a surface area of approximately 49 acres.

Materials observed at the W-3 WRA consist of quartz monzonite with varying degrees of surface oxide staining, and with particle sizes ranging from approximately 8-inch plus to silt-sized. Field observations and a review of area topography maps indicate relatively stable slopes. Edges of plastic liner material are visible in the side slope of the W-3 WRA in at least one location. No reports of observed seepage from the side slopes of W-3 WRA have been documented.

2.3 S-32 (Sulfide Ore) Waste Rock Area

Construction and Operation

Little information is available for the S-32 WRA, which was constructed by Anaconda. It is identified on historical maps as “Sulfide Tailings”, “Low-Grade Sulfide Ore”, and “S-32 Waste Rock”.

Land Status

The S-32 (Sulfide Ore) WRA is located entirely on private land.

Physical Description

The S-32 WRA covers an area of approximately 19 acres. It ranges in elevation from approximately 4,468 feet amsl at its northeast corner (near the Arimetco Plant Site) to approximately 4,594 feet amsl at its southern margin. An approximate 100-foot wide haul road provides access to the top surface of the S-32 WRA. The side slopes are generally at the angle-of-repose (1.4H:1V), and have a maximum height of 110 feet at the northeast corner. The top is generally flat with a total surface area of approximately 8 acres, including the haul road.

The material is a quartz monzonite with minimal surface oxide staining. The material appears to range in particle size from approximately 8-inch plus to silt-sized. Field observations and topographic maps indicate relatively stable slopes.

2.4 Summary of Current Conditions

The Waste Rock Areas have been inactive since approximately 1978, except for Arimetco's excavation of the W-3 WRA for heap leach materials. After filing for bankruptcy in 1997, Arimetco abandoned its operations at the Yerington Mine Site in January 2000. The current activities include fluid management, solution monitoring, and general care and maintenance at the mine site.

SECTION 3.0

WORK PLAN

Atlantic Richfield proposes to characterize waste rock materials in the three WRAs to assess the potential for these materials to pose a human health or ecological risk, and to provide the basis for evaluating closure alternatives for the WRAs consistent with the DQOs listed in Section 1.4. Additional waste rock characterization, as described in the *Draft Groundwater Conditions Work Plan* and modified for inclusion in this Work Plan, will include the collection of waste rock materials from two boreholes. One borehole will be drilled in each of the W-3 and S-32 WRAs for the installation of soil moisture monitoring probes. These probes will be used to evaluate the percolation of meteoric water through the WRAs. Sub-surface samples will be collected from lithologically diverse materials from each borehole for geotechnical and geochemical analyses, as described in the *Draft Groundwater Conditions Work Plan*. Site investigations, and related quality assurance/quality control (QA/QC) procedures, will be consistent with the DQOs described in Section 1.4 and the QAPP.

Prior to the start of work, field personnel will conduct a health and safety meeting to review the Site Health and Safety Plan (SHSP), the task-specific Job Safety Analysis (JSA), and to verify personal training certification. Copies of training certificates and attendance logs from the meeting will be obtained. All work will be conducted in accordance with the SHSP, and the JSA provided in Section 3.4.

3.1 WRA Characterization

Material Volumes

The quantity of material contained in each of the WRAs will be calculated by interpolating adjacent grades to estimate original ground topography, and comparing this surface with a Digital Terrain Model (DTM) surface based on topography generated by photogrammetric methods and dated August 2001.

Material Geotechnical and Geochemical Characteristics

Given the generally homogeneous nature of the materials observed on the WRAs, Atlantic Richfield anticipates that the proposed sampling locations shown in Figures 4 and 5 will be an adequate number of samples to collect for geotechnical and geochemical characterization of the WRAs. Discrete and composite sampling methods will be used to develop representative data for each WRA. Samples from side slopes will be collected from excavated areas to access representative waste rock materials. At each sample location, a visual description (accompanied by a photograph) will be made of the sample location and borehole or excavation.

The capacity of the material to retain moisture will also be evaluated. Samples will be collected for laboratory analysis of grain size distribution (ASTM D-422) and moisture storage capacity (ASTM D-2325/D-3152). These data will be used to estimate the field capacity, wilting point, and unsaturated hydraulic conductivity of the WRA materials. This information will be used to evaluate the moisture storage capacity and growth media characteristics of WRA materials. The grain size information may also be used to support the assessment of the materials to generate fugitive dust. Samples collected from the WRAs will also be submitted for whole-rock analysis, agricultural analysis and acid-base accounting (ABA).

The sample locations shown on Figures 4 and 5 are based on observed differences in waste rock mineralogy and apparent phase of deposition. Surface samples will be obtained by hand if possible, boreholes and soil-moisture stations will be installed by drilling, and side slope sample collection will be accomplished using a backhoe or excavator. Proposed sample locations and number of samples may be modified based on actual field conditions observed during sampling (e.g., accessibility and safety of side slope sampling). Not all of the collected samples from boreholes will be submitted for all of the analyses described above (e.g., samples from the boreholes at depth will not be submitted for agricultural analyses). Borehole samples will be selected on the basis of observed grain size and mineralogy from lithologically diverse materials.

A summary of proposed sample locations is presented below:

South Waste Rock Area (Figure 4)

At nine locations, samples will be collected and composited from a depth of 0 to 12 inches below the surface (i.e., one at each location). Each composited sample will be analyzed for acid-base-accounting (ABA), whole-rock analysis, agricultural parameters, moisture storage and grain size. Two samples along the side slopes are anticipated to be collected with a backhoe or excavator. The number of locations and samples is subject to change, based on accessibility and safety of the side slopes. No borehole samples will be collected from the South WRA.

W-3 Waste Rock Area (Figure 5)

At five locations, samples will be collected and composited from a depth of 0 to 12 inches below the surface (i.e., one at each location). Each composited sample will be analyzed for acid-base-accounting (ABA), whole-rock analysis, agricultural parameters, moisture storage and grain size. A borehole will be drilled through the vertical depth of the WRA, and a series of moisture probes will be installed at pre-determined depths. Soil samples will be collected from lithologically diverse materials and logged. The exact number of waste rock samples that will be collected is uncertain. Two samples along the side slopes are anticipated to be collected with a backhoe or excavator. The number of locations and samples is subject to change, based on accessibility and safety of the side slopes.

S-32 (Sulfide Ore) Waste Rock Area (Figure 5)

At four locations, samples will be collected and composited from a depth of 0 to 12 inches below the surface (i.e., one at each location). Each composited sample will be analyzed for acid-base-accounting (ABA), whole-rock analysis, agricultural parameters, moisture storage and grain size. A borehole will be drilled through the vertical depth of the WRA, and a series of moisture probes will be installed at pre-determined depths. Soil samples will be collected from lithologically diverse materials and logged. The exact number of waste rock samples to be collected is uncertain. Two samples along the side slopes are anticipated to be collected with a backhoe or excavator. The number of locations and samples is subject to change, based on accessibility and safety of the side slopes.

3.2 Data Collection and Analysis Procedures

Procedures for data collection and analysis will follow the specifications and standard operating procedures (SOPs) described in this section and the Draft QAPP. These procedures will adhere to QA/QC methods to ensure that the quality and quantity of the analytical data obtained during the field activities are sufficient to support the DQOs. QA/QC issues include:

- Detection limit and laboratory analytical level requirements;
- Selection of appropriate levels of precision, accuracy, representiveness, completeness, and comparability for the data and any specific sample handling issues; and
- Identification of confidence levels for the collected data.

Solids Sampling

WRA materials will be sampled by removing with hand tools (e.g., disposable plastic trowels or shovels) waste rock exposed to direct sunlight (e.g., up to one foot below the surface), and excavating from a single sample location approximately 2.5 gallons of material. This material will then be shaken in a 5-gallon bucket to eliminate strata variation effects, and the following splits will be obtained by hand-sorting to eliminate oversized material:

- For whole-rock analysis, a 2-kg (approximately 1 quart) sample in a clean re-sealable baggy.
- For agricultural and ABA analyses, a minimum of two 1-kg (approximately 1 pint) samples in clean re-sealable baggies.
- For geotechnical analyses, obtain an 18-kg sample in a clean bucket.

After obtaining these splits for geochemical analysis, the 5-gallon bucket will be filled with material from the same location, including surface material, for geotechnical analysis. Each sample will be sealed and labeled with QA/QC procedures described below prior to shipment to the analytical laboratory.

Duplicate samples will be collected at a frequency of one in ten samples, by filling the containers for each analysis at the same time the original sample is collected. Each sample from a duplicate set will have a unique sample number labeled in accordance with the identification protocol, and the duplicates will be sent "blind" to the lab. For quality assurance purpose, no special labeling indication of the duplicate will be provided.

Solids Analyses

For each of the sample locations shown in Figures 4 and 5, waste rock will be analyzed for whole-rock chemistry (Inductively Coupled-Plasma and Mass Spectrometry or Optical Emission Spectrometry), static acid base accounting (ABA), agricultural parameters and geotechnical characteristics. The constituents to be analyzed for whole-rock chemistry are listed in Table 2. Samples for the evaluation of agricultural properties will be analyzed for Nitrogen, Phosphorus and Potassium (NPK) concentrations; Boron, Chlorine, Calcium, Magnesium and Sodium concentrations; and the calculation of the Sodium Absorption Ratio (SAR).

Sample Identification and Preservation

Sample labels will be completed and attached to each laboratory sample container prior to sample collection. Strict attention will be given to ensure that each sample location corresponds to the field identification number marked on the sample container prior to sample collection. The labels will be filled out with a permanent marker and will include the following information:

- Sample identification
- Sample date
- Sample time
- Analyses to be performed
- Person who collected sample

Each sample will be tracked according to a unique sample field identification number assigned when the sample will be collected. This field identification number will consist of two parts:

- Sampling location
- Collection sequence number

For example, the sample collected on the W-3 WRA at the second location sampled will be labeled: WRAW3-002. Duplicate samples will be labeled in the same fashion, with no indication of their contents. For example, the duplicate sample to the one stated above might be labeled: WRAW3-003.

Sample Handling and Transport

The QA objectives for the sample-handling portion of the field activities are to verify that packaging and shipping are not introducing variables into the sampling chain that could provide any basis to question the validity of the analytical results. In order to fulfill these QA objectives, duplicate QC samples will be used as described in the QAPP. If the analysis of any QC samples indicates that variables are being introduced into the sampling chain, then the samples shipped with the questionable QC sample will be evaluated for the possibility of contamination.

3.3 Site Job Safety Analysis

A site-specific Job Safety Analysis (JSA) for this Work Plan is attached as Appendix C, in accordance with Atlantic Richfield Health and Safety protocol and the Brown and Caldwell Yerington Mine Site Health and Safety Plan (SHSP). The SHSP identifies, evaluates, and prescribes control measures for safety and health hazards, in addition to providing for emergency response at the Yerington Mine site. SHSP implementation and compliance will be the responsibility of Brown and Caldwell, with Atlantic Richfield taking an oversight and compliance assurance role. Any changes or updates will be the responsibility of Brian Bass with Brown and Caldwell, with review by Atlantic Richfield Safety Representative Lorri Birkenbuel. Three copies of this plan will be maintained. One copy will be located at the site, one copy will be located in Atlantic Richfield's Anaconda office, and one copy will be located in the Brown and Caldwell office. The SHSP includes:

- Safety and health risk or hazard analysis;
- Employee training records;
- Personal protective equipment (PPE);
- Medical surveillance;
- Site control measures (including dust control);

- Decontamination procedures;
- Emergency response; and
- Spill containment program.

The SHSP includes a section for site characterization and analysis that will identify specific site hazards and aid in determining appropriate control procedures. Required information for site characterization and analysis includes:

- Description of the response activity or job tasks to be performed;
- Duration of the planned employee activity;
- Site accessibility by air and roads;
- Site-specific safety and health hazards;
- Hazardous substance dispersion pathways; and
- Emergency response capabilities.

All contractors will receive applicable training, as outlined in 29CFR 1910.120(e) and as stated in the SHSP. Copies of Training Certificates for all site personnel will be attached to the SHSP. Personnel will initially review the JSA forms at a pre-entry briefing. Site-specific training will be covered at the briefing, with an initial site tour and review of site conditions and hazards. Records of pre-entry briefings will be attached to the SHSP.

Elements to be covered in site-specific briefing include: persons responsible for site-safety, site-specific safety and health hazards, use of PPE, work practices, engineering controls, major tasks, decontamination procedures and emergency response. Other required training, depending on the particular activity or level or involvement, may include MSHA 40-hour training and annual 8-hour refresher courses. Other training may include, but is not limited to, competent personnel training for excavations and confined space, first aid, and cardio-pulmonary resuscitation (CPR). Copies of the 40-hour and annual refresher certificates, for site personnel, will be attached to the SHSP.

The individual JSA for the Waste Rock Areas work incorporates individual tasks, the potential hazards or concerns associated with each task, and the proper clothing, equipment, and work approach for each task. The following table outlines the tasks and associated potential hazards that are included in the Waste Rock Area JSA:

SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARDS
1. Collect solid materials samples	• Skin irritation from demal or eye contact • Steep slopes, hard, sharp, irregular surfaces on all WRAs
2. All Activities	• Slips, Trips, and Falls
3. All Activities	• Back, hand, or foot injuries during manual handling of materials.
4. All Activities	• Heat exhaustion or stroke.
5. All Activities	• Hypothermia or frostbite
6. Unsafe conditions.	• All potential hazards.

A copy of the Waste Rock Area JSA is provided in Appendix C.

SECTION 4.0

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FIGURES